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WHAT IS CLAIMED IS:

1. A process field device for coupling to a two wire process control loop, comprising:
 - a field device circuitry;
 - a switching regulator configured to power the field device circuitry;
 - a bulk capacitance coupled to an input of the switching regulator configured to provide power to the switching regulator;
 - a series voltage regulator configured to provide a regulated supply voltage to the bulk capacitance; and
 - a noise filter configured to couple the series voltage regulator to the two wire process control loop to power the series voltage regulator with power from two wire process control loop and to block noise from the switching regulator from entering the two wire process control loop.
2. The apparatus of claim 1 wherein the noise filter includes a capacitor.
3. The apparatus of claim 2 wherein the noise filter includes an active component configured to increase the effective capacitance of the capacitor.
4. The apparatus of claim 3 wherein the active component includes three terminals.

5. The apparatus of claim 4 wherein a first terminal of the active component couples to the two wire process control loop, a second terminal of the component couples to the bulk capacitance and a third terminal of the component couples to the series voltage regulator.

6. The apparatus of claim 5 wherein the active component comprises a field effect transistor and third terminal comprises a gate of the field effect transistor.

7. The apparatus of claim 4 wherein a first terminal of the component couples to the two wire process control loop, a second terminal of the component couples to one side of the capacitor and a third terminal couples to another side of the capacitor.

8. The apparatus of claim 1 wherein the noise filter includes a field effect transistor.

9. The apparatus of claim 1 wherein the noise filter includes two field effect transistors and two capacitors.

10. The apparatus of claim 1 wherein the series voltage regulator includes an operational amplifier.

11. The apparatus of claim 10 wherein the series voltage regulator includes a capacitor configured to provide negative feedback to the operational amplifier.

12. A method of providing power to a circuitry of a field device in a two wire process control loop, comprising:

receiving power from the two wire process control loop;

preregulating the received power to a regulated voltage level;

charging a bulk capacitance with the regulated voltage level;

providing power to the circuitry of the field device with a switching regulator coupled to the bulk capacitance; and

filtering noise from the switching regulator from entering the two wire process control loop.

13. The method of claim 12 wherein filtering noise from the switching regulator includes actively filtering noise.

14. The method of claim 13 wherein actively filtering noise includes using a three terminal active component.

15. The method of claim 14 wherein a first terminal of the active component couples to the two wire process control loop, a second terminal of the component couples to the bulk capacitance and a third terminal of the component couples to a series voltage regulator.

16. The method of claim 13 wherein the active component comprises a field effect transistor and third terminal comprises a gate of the field effect transistor.

17. The method of claim 12 wherein filtering noise includes using a capacitor.

18. The method of claim 17 wherein filtering noise includes using an active component configured to increase the effective capacitance of the capacitor.

19. The method of claim 18 wherein the active component includes three terminals.

20. The method of claim 19 wherein a first terminal of the component couples to the two wire

process control loop, a second terminal of the component couples to one side of the capacitor and a third terminal couples to another side of the capacitor.

21. The method of claim 12 wherein filtering noise includes using a field effect transistor.

22. The method of claim 12 wherein filtering noise includes using two field effect transistors and two capacitors.

23. The method of claim 12 wherein the preregulating includes using operational amplifier.

24. The method of claim 23 wherein preregulating further includes providing negative feedback to the operational amplifier through a capacitor.